

THE INVENTION CLAIMED IS:

1. An apparatus for cutting trees to complement the operation of a chain saw, wherein the apparatus is supported upon a structure and wherein the apparatus comprises:

a) a chain saw guide secured to the structure, wherein the guide has

- 1) an opening adapted to accept a tree trunk,
- 2) a generally planar bottom surface adapted to rest upon the terrain, and

- 3) a chain saw pivotally mounted to the guide about an axis to traverse the entire opening along a plane parallel to the planar bottom surface from a starting cut position to a finishing cut position, wherein the starting cut position defines a starting cut point and wherein the finishing cut position defines a finishing cut point;

b) a securing tower for selectively securing and releasing the tree trunk, wherein

- 1) the securing tower has a centerline extending along its length,
- 2) the securing tower is pivotally supported by a tower pivot mounted upon the structure to provide rotation about a tower pivot axis, and

- 3) the tower pivot axis is located above and offset in a direction away from the finishing cut point, such that a tree trunk secured within the tower will be urged upward and away from the finishing cut point when the tower is pivoted away from the chain saw guide.

2. The apparatus according to claim 1, wherein the chain saw guide is pivotally supported by a chain saw guide pivot mounted upon the structure to provide rotation about a chain saw guide pivot axis.

3. The apparatus according to claim 2, wherein the tower pivot is supported upon the chain saw guide which is supported upon the structure such that when the chain saw guide is pivoted, the tower pivot is displaced along an arc defined between the chain saw guide pivot and the tower pivot.

4. The apparatus according to claim 2, wherein the chain saw guide pivot is located below and away from the tower pivot in a direction away from the finishing cut point.

5. The apparatus according to claim 1, further including a tower pivoting device attached to the support and to the tower for selectively pivoting the tower.

6. The apparatus according to claim 5, wherein the tower pivoting device is a hydraulic cylinder connected between the tower and the support.

7. The apparatus according to claim 5, wherein the chain saw guide is linked to the tower to limit downward rotation of the chain saw guide.

8. The apparatus according to claim 7, wherein the chain saw guide is linked to the tower by a chain extending from the tower to support the chain saw guide and thereby limit downward rotation.

9. The apparatus according to claim 8, wherein the chain length is adjustable to orient the chain saw guide in a desired angular orientation.

10. An apparatus for cutting trees to complement the operation of a chain saw, wherein the apparatus is supported upon a structure and wherein the apparatus comprises:

- a) a chain saw guide secured to the structure, wherein the guide has
 - 1) an opening adapted to accept a tree trunk,
 - 2) a generally planar bottom surface adapted to rest upon the terrain,
 - 3) a chain saw pivotally mounted to the guide about an axis to traverse the entire opening along a plane parallel to the planar bottom surface from a starting cut position to a finishing cut position, wherein the starting cut position defines a starting cut point and wherein the finishing cut position defines a finishing cut point, and
 - 4) wherein the chain saw guide is pivotally supported by a chain saw guide pivot mounted upon the structure to provide rotation about a chain saw guide pivot axis;

b) a securing tower for selectively securing and releasing the tree trunk, wherein

- 1) the securing tower has a centerline extending along its length,
- 2) the securing tower is pivotally supported by a tower pivot mounted upon the structure to provide rotation about a tower pivot axis,
- 3) the tower pivot axis is located above and offset in a direction away from the finishing cut point, such that a tree trunk secured within the tower will be urged upward and away from the finishing cut point when the tower is pivoted away from the chain saw guide, and
- 4) the tower pivot is supported upon the chain saw guide which is supported upon the structure such that when the chain saw guide is pivoted, the tower pivot is displaced along an arc defined between the chain saw guide pivot and the tower pivot.

11. An apparatus for cutting trees on a sloping terrain, wherein the apparatus is supported upon a structure, wherein the apparatus comprises:

- a) a chain saw guide pivotally connected to the structure, wherein the chain saw guide has an opening to accept a tree trunk, a generally planar bottom surface adapted to rest upon the terrain and a chain saw pivotally mounted to the guide to traverse the entire opening along a plane parallel to the planar bottom surface from a starting cut position to a finishing cut position, wherein the starting cut position defines a starting cut point and wherein the finishing cut position defines a finishing cut point, and
- b) a securing tower for selectively securing and releasing the tree trunk.

12. The apparatus according to claim 11, wherein the chain saw guide is pivotally supported by a chain saw guide pivot mounted upon the structure to provide rotation about a chain saw guide pivot axis.

13. The apparatus according to claim 12, wherein the tower has a tower pivot that is supported upon the chain saw guide such that when the chain saw guide is pivoted, the tower pivot is displaced along an arc defined between the chain saw guide pivot and the tower pivot.

14. The apparatus according to claim 12, wherein the chain saw guide pivot is located below and away from the tower pivot in a direction away from the finishing cut point.

15. The apparatus according to claim 11, further including a tower rotation device attached to the support and to the tower for selectively pivoting the tower.

16. The apparatus according to claim 15, wherein the tower rotation device is a hydraulic cylinder connected between the tower and the support.

17. An apparatus for securing trees during and after a cutting operation using a chain saw, wherein the apparatus is supported upon a structure and wherein the apparatus comprises:

- a) a securing tower adapted to secure a tree trunk therein, wherein the tower has an upper end and a lower end, which define the length and wherein the tower further has a first side, a second side and a rear side;
- b) a stabilizer at the upper end of the tower,
- c) at least one clamping arm on each the first side and the second side of the tower, wherein each arm is spaced from the other arm and each bar is positioned at a different location along the length of the tower and wherein at least one clamping arm may independently pivot from an open position to a closed position suitable to embrace the tree against the tower or release the tree from the tower, and
- d) at least one blade protruding from the rear side of the tower, wherein the blade has an edge adapted to penetrate a tree trunk when the tree is embraced within the tower.

18. The apparatus according to claim 17, wherein there is at least one clamping arm on each the first side and the second side that may independently pivot from an open position to a closed position suitable to selectively embrace the tree or to release the tree in a controlled fashion to cause it to fall in a particular direction.

19. The apparatus according to claim 17, wherein the clamping arms that may independently pivot are each operated by a dedicated drive device.

20. The apparatus according to claim 19, wherein the dedicated driving device for each pivotable clamping arm is an electric motor.

21. The apparatus according to claim 20, wherein the electric motor is self locking.

22. The apparatus according to claim 17, wherein each pivotable clamping arm is comprised of two extensions and wherein each clamping arm is positioned to an adjacent clamping arm in a non-overlapping fashion.

23. A tensioning apparatus for a chain on a chain saw comprising:

- a) a base with a drive sprocket rotatably mounted therein about an axis;
- b) a chain saw bar secured to a chain support and slidingly mounted to the base in a direction radial to the sprocket axis, wherein the bar has an outer rim;
- c) a chain supported by a chain support and attached to the drive sprocket and engaged and guided to slide over the outer rim of the chain saw bar
- d) a biasing element, which urges the chain saw bar in the radial direction away from the sprocket, thereby imparting a tension to the chain.

24. The tensioning apparatus according to claim 23, wherein the chain saw bar is slidingly mounted to the base through a dovetail configuration and wherein one of a dovetail projection or dovetail cavity within the base engages the other of a dovetail projection or dovetail cavity within the chain support.

25. The tensioning apparatus according to claim 24, wherein the biasing element is a compression spring fitted between the base and the chain support to urge the chain support away from the base, such that the tension in the chain may be predetermined as a function of the compression spring.

26. The tensioning apparatus according to claim 25, wherein the compression spring is a coil spring.

27. The tensioning apparatus according to claim 23, wherein the biasing element is one from the group consisting of a hydraulic piston and a pneumatic piston.

28. The tensioning apparatus according to claim 23, further including a locking mechanism to secure the chain saw bar in a fixed position relative to the base.

29. The tensioning apparatus according to claim 28, wherein the locking mechanism is a friction device that introduces friction between the base and the chain saw bar to prevent sliding motion between them.

30. The tensioning apparatus according to claim 29, wherein the friction device is a rod extending through one of the chain support or the base and contacting the other to introduce friction between them.

31. The tensioning apparatus according to claim 30, wherein the rod is activated to produce friction when the chain is in operation and is de-activated to release friction when the chain is not in operation.

32. A tensioning apparatus for a chain on a chain saw comprising:

- a) a base with a drive sprocket rotatably mounted therein about an axis;
- b) a chain saw bar secured to a chain support and slidably mounted to the base in a direction radial to the sprocket axis, wherein the bar has an outer rim;
- c) a chain supported by a chain support and attached to the drive sprocket and engaged and guided to slide over the outer rim of the chain saw bar;
- d) a biasing element, which urges the chain saw bar in the radial direction away from the sprocket, thereby imparting a tension to the chain, wherein the biasing element is a compression spring fitted between the base and the chain support to urge the chain support away from the base, such that the tension in the chain may be predetermined as a function of the compression spring;
- e) wherein the chain saw bar is slidably mounted to the base through a dovetail configuration and wherein one of a dovetail projection or dovetail cavity

within the base engages the other of a dovetail projection or dovetail cavity within the chain support; and

f) a locking mechanism to secure the chain saw bar in a fixed position relative to the base.

33. An apparatus for radially pivoting and driving a chain saw comprising:

a) a base having a cylindrical bore extending therethrough about an axis;

b) a cylindrical hub rotatably mounted within the bore of the base about the axis, wherein the hub has a cylindrical bore extending therethrough, wherein the chain saw is mounted upon the exterior of the cylindrical hub;

c) a drive shaft extending through and rotatably supported within the bore of the hub about the axis;

d) a hub drive mechanism for rotating the cylindrical hub through a range of rotational motion about the axis, wherein the chain saw is thereby pivoted through the same range of rotational motion; and

e) a chain drive mechanism for rotating a drive sprocket on the chain saw to drive the chain.

34. The apparatus according to claim 33, wherein the hub drive mechanism is comprised of a driven gear mounted to a portion of the cylindrical hub and a driver gear mounted to a motor secured with the base, wherein the driver engages the pinion gear to pivot the chain saw within the range.

35. The apparatus according to claim 34, wherein the motor is secured to the base.

36. The apparatus according to claim 35, wherein the motor is an electric motor/brake.

37. The apparatus according to claim 33, further including at least one sensor on the cylindrical hub to identify the rotational position of the cylindrical hub and attached chain saw.

38. The apparatus according to claim 37, wherein the at least one sensor is a plurality of sensors mounted upon either the base or the cylindrical hub.

39. The apparatus according to claim 38, wherein the sensors consist of one from the group of Hall effect sensors, reed switch sensors and mechanical sensors.

40. The apparatus according to claim 33, wherein the cylindrical hub is rotatably secured within the base using bearings along the length of the cylindrical hub.

41. The apparatus according to claim 33, further including limit switches at the limits of motion for the cylindrical hub rotation.

42. A tree harvester comprising:

- a) a pivoting securing tower;
- b) a pivoting chain saw guide;
- c) an arrangement to secure a tree trunk within the tower;
- d) a chain saw pivoting/driving apparatus; and
- e) a chain saw tensioning device.